hornblende, seem to point rather to the formation of a composite rock along an intrusive junction.

Messrs. Kynaston and Hall conclude this important report with an account of what they style "diamondiferous" pipes and alluvial deposits. It is suggested that the diamond-bearing vents were connected with the great uplift that followed the close of the Karroo period in South Africa.

Some of Mr. Mellor's results, now detailed in the official memoir, were communicated earlier in 1904 to the Geological Society of South Africa, and have been incorporated in Dr. Molengraaff's "Geology of the Transvaal."[1] This handy work, the publisher of which is not named, now replaces the well known paper in the *Bulletin de la Société géologique de France* for 1901. It is accompanied by a coloured sketch map on the scale of 1 : 500,000.

GRENVILLE A. J. COLE.

OUR MUSEUMS.[2]

THE object of the association, of which the manifold spheres of activity are chronicled in the *Museums' Journal*, is the promotion of the better and more systematic working of museums. That museums are destined to play a very important function in the future education of our race every curator is fully convinced. Yet anyone perusing the pages of the *Museums' Journal* will be struck by the apparent want of unanimity among those into whose charge such institutions have been placed as to the best methods to be adopted in conveying to the public the educational advantages offered. A learned German museum official thought that if artistic skill were more cultivated the public would show increased appreciation for museums. He insists that the greater the knowledge of drawing in a community, the greater the value of a museum as an educational institution for a nation. Dr. Hecht, a French museum authority, advocates placing among natural history specimens a number of attractive and pleasing exhibits so as to lead the mind of the visitor to larger ideas, and to show him by well chosen illustrations in how many ways animal life is connected with human civilisation. Another gentleman argues that the doctrine of evolution should be the key-note of museum work, while Mr. Pycraft directs attention to a real defect in many of our museums in the manner in which our animals are mounted. He gives as an instance how the train of the peacock, commonly called its "tail," is often placed as if it arose from the hinder end of the body, while in reality when erect it stands in front of the wings, as shown in the accompanying illustration reproduced from Mr. Pycraft's paper.

"Would it not be well," remarks Dr. Bather very aptly in his excellent presidential address at the Aberdeen conference of the Museums' Association, "for each of us Museum curators occasionally to ask himself the question: What exactly is the object of my Museum?" While laying stress on inspiration as one of the principal functions of a museum, by which Dr. Bather understands the selection and display of material so as to attract members of the general public,

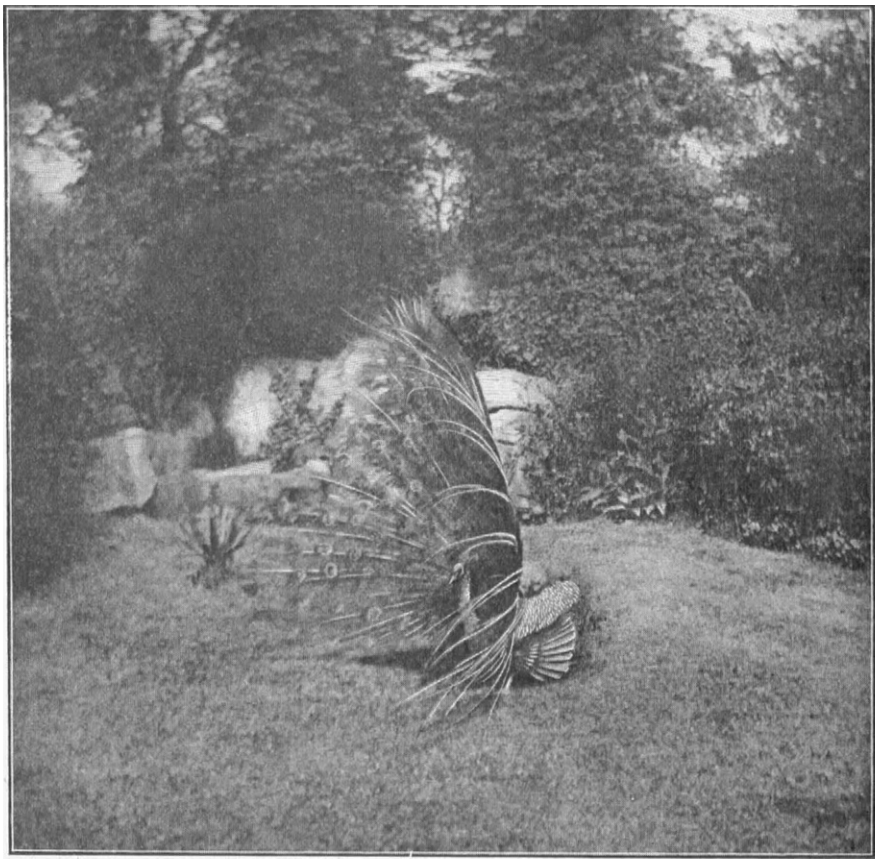

FIG. 1.—Side view of the Peacock in display showing that, when erect, the train stands in *front* of the wings, and not behind them. From the *Museums' Journal*.

he does not, however, touch upon the really vital point to the museum curator—how can we best induce the community to enter the doors of our institutions?

The scope of museums is extended from year to year, and everything is done to widen the sphere of their usefulness. A museum is no longer a place for exhibition only, but a place for research and investigation, and for the encouragement of those who desire to devote their time to such. Yet no one like the museum curator is more impressed with the fact that, in spite of all his efforts to make his collections appeal to the public, in spite of his heartfelt desire to teach both old and young, he only succeeds in attracting within the walls of the institution a comparatively small percentage of the community. What is really wanted, it seems to us, is that schools and museums

1 "Geology of the Transvaal." By Dr. G. A. F. Molengraaff. Translated by J. H. Ronaldson, M.E. With Additions and Alterations by the Author. Pp. viii+90. (Edinburgh and Johannesburg, 1904.)

2 *The Museums' Journal*. Edited by E. Howarth. Vol. iii. (July, 1903, to June, 1904). Pp. x+436 and 73–142. (London: Dulau and Co., 1904.) Price 12*s*. net.

should work hand in hand to aid one another in the supreme object of education. A beginning in that direction has been made in the United States and in some towns in England, where the young are taught in the lecture theatre and are then conducted by the teacher to the section of the museum dealing with the subject of the discourse. In this way the young are familiarised with the objects and uses of museums, to which they will surely more readily return in after life, and in the development of which they will take a keener interest than they do at present. R. F. S.

DR. FRANK McCLEAN, F.R.S.

IN Dr. Frank McClean astronomy has not only lost one of her most devoted and painstaking followers, but a generous benefactor that can ill be spared, especially in this country. His death came as a surprise to most of his friends, for, although it was known that his increasing years were beginning to tell on his general activity, it was thought that there was still much work left in him. Unfortunately, however, this was not to be, for, at the latter end of his usual trip on the Continent, he was taken ill at Brussels, and very shortly afterwards passed away on November 8 at the age of sixty-seven, surrounded by members of his family.

Dr. McClean was the son of the late distinguished engineer, Mr. J. R. McClean, F.R.S., and was born in 1837. After the completion of his education at Westminster, the College, Glasgow, and Trinity College, Cambridge, of which he was a scholar, graduating in 1859 as a wrangler, he took up the profession of his father, and became apprenticed in the same year to Sir John Hawkshaw; three years later he was taken into partnership in the firm of Messrs. McClean and Stileman.

Up to the year 1870 his energy was directed to engineering matters, but retiring from his profession, he devoted the remaining years of his life to spectroscopic researches in connection with the sun and stars. The success which rewarded his endeavours is best shown by the numerous important papers which he communicated to the Royal Society and Royal Astronomical Society, and by the fact that the council of the latter society awarded him, in 1899, the gold medal, their highest honour for astronomical research. The crowning work, which he fortunately completed, and with which his name will always be associated, was the conception and carrying out of the great spectroscopic survey of the brighter stars over the whole celestial sphere.

He commenced his spectroscopic work with several important researches, all of which were carried out with zeal, patience, and thoroughness; these were naturally closely allied, in fact preliminary steps, to the great work to which he later devoted his energies. The first of these dealt with the photography of metallic spectra by means of an induction spark, after which he turned his attention to the nearest star, the sun, and made an elaborate series of comparative photographs of the spectra at high and low altitudes. An account of this, accompanied by a beautiful atlas of plates, was submitted in 1890 to the Royal Astronomical Society. The high sun spectrum was taken as far as possible when the sun's altitude was more than 45°, and the low sun when it was under $7\frac{1}{2}$°, so that the depth of atmosphere traversed was in the proportion of one to five respectively. For securing these photographs he employed a fixed heliostat to reflect the solar light into a telescope fixed parallel to the polar axis, in conjunction with a spectroscope in which was used a large Rowland plane grating.

The investigation brought out in a striking manner the different effects of atmospheric absorption in the solar spectrum, and put one on a firmer footing as regards the variations due to atmospheric influences.

After the publication of these results, McClean turned his attention again to terrestrial spectra, and made a minute study of the comparative photographic spectra of the sun and metals. The first results were connected with the spectra of the gold and iron groups of metals. These spectra were collated by means of their common air lines with the iron spectrum, and so by means of the iron lines with the solar spectrum. In the gold group he found many lines due to these metals which up to that time had not been observed, and he also remarked some curious coincidences that existed between the air lines in the metallic spectra and lines in the solar spectrum. That he had in his mind the eventual spectroscopic study of the heavenly bodies is shown even in his brief accounts of these experiments, for in one case he writes, "the spectra of the metals appear to me to be fairly within the scope of astronomy, as our knowledge of them forms the basis of any knowledge we possess of the composition of the heavenly bodies."

At the end of 1891 he published another set of comparative spectra of the sun and metals. The two series consisted of six sections, corresponding to six sections of Angstrom's chart; they were as follows:—

Section i. contained the spectra of the sun, iron, platinum, iridium, osmium, palladium, rhodium, ruthenium, gold, and silver. The last eight constitute the platinum group of metals.

Section ii. contained the spectra of the sun, iron, manganese, cobalt, nickel, chromium, aluminium, and copper. These seven metals constitute the iron copper group.

Throughout McClean's scientific career his greatest work was undoubtedly the spectroscopic survey of every star brighter than $3\frac{1}{2}$ magnitudes scattered throughout the whole celestial sphere.

Such a programme seemed large for one man to tackle single-handed, but McClean was equal to the occasion, and succeeded not only in accomplishing it, but in discussing and publishing the results.

For the northern stars the photographs were secured at his home, Rusthall House, Tunbridge Wells. The instrument employed was a photographic telescope having an object glass of twelve inches diameter, and carrying an objective prism of the same aperture, with a refracting angle of 20°.

To secure the southern stars McClean worked at the Cape of Good Hope from May to November, 1897. He took with him the prism he had already used for the northern work, and fixed it in front of the object glass of the well-known Cape astrographic instrument, which had been placed at his disposal by Sir David Gill. Both series of photographs were thus secured with practically identical instruments, the advantage of which it is difficult to overestimate.

Space does not permit, nor is it here necessary, to enumerate at any length the results of such a far-reaching research, which were so ably discussed, and received such high praise. Mention, however, may be made of the originality he displayed in referring the stars to galactic latitude and longitude, instead of employing the usual system of right ascension and declination. The celestial sphere he divided into four equal areas by drawing a circle at a radius of 60° from each galactic pole. By means of a great circle passing through the galactic poles, he cut the sphere into two halves, so that each of the four areas was again equally divided. This apparently simple portioning of the heavens was amply rewarded.